Nondefault Sampling

General Procedure

- Define the Sample Area
  - Source Area
  - Horizontal Stratum
- Develop A COC List
- Develop A Sampling Plan
- Establish the Closure Level
- Develop PECs
- Specify Error Levels
- Take Samples

Sample Size

- Judgmental Sampling
  - Worst Case Scenario
  - As Many As It Takes
- Statistical Sampling
  - Adequate To Satisfy the Requirements of the Test Being Used
  - How close Is the Mean To the Closure Level?
  - How Much Variability Is There In the Data?

Calculating Sample Size

- Sample Size Equation

$$n = \frac{(Z_a + Z_b)^2}{(C_s - m_1)^2} s^2 + \frac{Z_a^2}{2}$$

Selecting Sample Locations

- Sample Design
  - What Question Are You Trying To Answer?
    - If You Know the Question, the Design Process Becomes Easier
    - Each Activity Should Contribute To Answering the Question
  - Gathering Information Before Developing A Sample Design Yields A Better Product

Selecting Sample Locations

- Presampling Activities
- Random Or Judgmental?
  - Random Is Often Used when There Is Little Prior Knowledge
  - There Are Methods To Control the Sample Size Of Random Samples
  - Judgmental Sampling Requires Prior Knowledge, Experience, and Trustworthiness, and the Sample Size May Be Large
  - Bad Judgement Yields Bad Results

Grid Sampling

- Grid Size
  - Varies According To Circumstances
  - Small In Highly Contaminated Areas
  - Larger in the “Back 40”
  - Generally No Larger Than Ten Feet If Contamination Is Suspected
  - All Intersections (Including Along the Edges) Count As Grid Points

Grid Sampling

- It Is Often Difficult To Locate the Selected Grid Points In the Field
- Sometimes Buildings, Roads, etc. Interfere With Sample Locations
- If You Have No Information To Use In Calculating the Sample Size, You May Use the Cube Root Of the Number Of Grid Points For Preliminary Sampling
- Check Your Sample Size Using the Sample Size Calculation
- Remobilization May Be Required

Ranked Set Sampling

- Gives A Better Estimate Of the Mean Than A Simple Random Sample
- Can Be Used Under Certain Conditions
- Not Applicable For All Sites and Contaminants
- Based On Dividing the Population Into Subpopulations

Applying RSS

- Randomly Select Sample Units From the Population
- Randomly Allocate the Sample Units Into Groups
- Rank the Units Within Each Group
- Choose Samples To Be Included In the Analysis
- Repeat the Steps Until An Adequate Sample Size Is Obtained
- The Representativeness of the Sample Is Increased

Ranking Criteria

- The Ranking Mechanism Is Critical
- Does Not Have To Measure Accurately
- Has To Measure Well Enough To Rank Samples Low, Medium, High
- Sometimes It Is Possible To Use A Surrogate